

REMARKS

I. Status Summary

Claims 1-28 are pending in the present application and are currently examined. Claims 10, 11 and 14 are herein cancelled. The restriction between Groups I and V has been withdrawn and, therefore, claims 1-3, 9-14 and 25-28 are pending. Claims 4-8 and 15-24 are withdrawn due to restriction requirement. Claims 1, 9, 12, 25 and 28 are herein amended. Applicants reserve the right to file divisional applications on the non-elected claims.

The Patent Office has objected to claims 10, 11 and 12. Claims 12 and 14 are rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. The Patent Office has rejected claims 1, 9, and 12-14 under 35 U.S.C. §§ 102(a)-(b) and 102(e) as allegedly being anticipated by *Yasuda et al.* (U.S. Patent No. 6,093,370, issued July 25, 2000; hereinafter "*Yasuda et al.*"); *Kuhr et al.* (U.S. Patent No. 6,294,392, issued September 25, 2001; hereinafter "*Kuhr et al.*") and *Suyama* (U.S. Patent No. 6,559,296, filed February 21, 2001; hereinafter "*Suyama*."). The Patent Office has rejected claims 2-3 and 10-11 under 35 U.S.C. § 103(a) as allegedly being unpatentable over *Yasuda et al.* in view of *Suyama* and as allegedly being unpatentable over *Kuhr et al.* in view of *Suyama*. The Patent Office has rejected claims 25-28 under 35 U.S.C. § 103(a) as allegedly being unpatentable over *Yasuda et al.* in view of *Shalon et al.* (U.S. Patent Application Publication No. 2001/0051344, published December 13, 2001; hereinafter "*Shalon et al.*").

II. Claim Amendments

Claims 1 and 25 are amended by insertion of two phrases as follows: "and an electrical potential applied separately to each segment" and "wherein the electrical potential allows for different levels of stringency of hybridization in each probe segment". Support for these amendments can be found throughout the claims and specification as filed and, in particular, at pages 20-21 and original claims 15 and 22. Accordingly, no impermissible new matter has been added by this claim amendment.

Claim 9 is amended for clarity to depend from claim 1. Support for these amendments can be found throughout the claims and specification as filed. Accordingly, no impermissible new matter has been added by this claim amendment.

Claim 12 is amended for clarification of the Markush group and by deletion of certain of the species in the group. Support for these amendments can be found throughout the claims and specification as filed. Accordingly, no impermissible new matter has been added by this claim amendment.

Claim 28 is amended to correct a typographical error. Accordingly, no impermissible new matter has been added by this claim amendment.

III. Response to Objections to the Claims

Claims 10 and 11 are objected to for allegedly being duplicates of claims 2 and 3. Claims 10 and 11 are herein canceled. Dependent claim 12 is objected to for allegedly failing to further limit independent claim 1. Claim 12 is herein amended by deletion of certain of the species listed in the Markush group. Therefore, Applicants respectfully assert that the objection is believed to have been obviated by amendment.

IV. Response to the Rejections under 35 U.S.C. § 112, Second Paragraph

Claims 12 and 14 are rejected under 35 U.S.C. § 112, second paragraph, for allegedly failing to particularly point out and distinctly claim the subject matter. Applicants respectfully disagree with the § 112 rejections and submit that the original claims are not unclear, as one of ordinary skill in the art would understand what is meant by the claims. However, in order to facilitate prosecution of the application, the claims are herein amended as follows.

Claim 12 is herein amended by deletion of the "/" mark and replacement with the phrases: "modified nucleotides", "blocked nucleotides", and "modified nucleosides" and "blocked nucleosides". Claim 14 is herein canceled. Accordingly, Applicants respectfully submit that the rejections have been overcome and request withdrawal of the rejection of claim 12 under 35 USC § 112, second paragraph.

V. Response to the Rejections under 35 U.S.C. § 102

Claims 1, 9, and 12-14 have been rejected under 35 U.C.S. §§ 102(a)-(b) and 102(e) as allegedly being anticipated by *Yasuda et al.*, *Kuhr et al.* and *Suyama*. Applicants respectfully traverse the rejections under § 102.

The instant application provides a microcapillary hybridization chamber comprising a narrow bore tubing and probe segments. Each probe segment comprises oligonucleotide probes which are covalently attached to the inner wall of the tubing, and the oligonucleotide probes within each segment have identical, known sequences. The probe segments can be distinguishable from each other. A solution comprising a target molecule can be passed through the hybridization tube and an electrical potential can be applied separately to each probe segment. The target molecules hybridize to the probe molecules, thereby permitting capture and/or identification of the target molecules. The application of the electrical potential can allow for different levels of stringency of hybridization of the target molecules to the probe molecules in each probe segment. See, for example, pages 20-21 of the instant application.

In response to the 35 U.S.C. §102(b) rejection of claims 1, 9, and 12-14 as allegedly being anticipated by *Yasuda et al.*, applicants respectfully submit that a microcapillary hybridization chamber as recited in current claim 1, and claims 9 and 12-14 depending thereon, is not anticipated by *Yasuda et al.* Specifically, a microcapillary hybridization chamber comprising a narrow bore tubing with probe segments and an electrical potential applied separately to each segment, wherein the electrical potential allows for different levels of stringency of hybridization in each probe segment is not anticipated by *Yasuda et al.* For example, *Yasuda et al.* at best appears to disclose a method and an apparatus for separating polynucleotides in the form of a capillary, wherein nucleotide probes are immobilized on the surface of the capillary and differing amounts of heat are applied to individual areas on the surface to enhance the separation. In addition, *Yasuda et al.* appears to disclose application of an electrical field to the individual areas of the surface. However, the field is used to attract nucleotide molecules only to the surface of the capillary rather than to increase the stringency of hybridization as disclosed and claimed in the instant

application. Accordingly, *Yasuda et al.* fails to teach or disclose application of an electrical potential separately to each segment, wherein the electrical potential allows for different levels of stringency of hybridization in each probe segment as recited in instant claim 1. Accordingly, *Yasuda et al.* fails to teach or disclose every element of the instant claims and, therefore, applicants respectfully request withdrawal of the rejection of claims 1, 9, and 12-14 under 35 U.S.C. §102(b).

In response to the 35 U.S.C. §102(a) & (e) rejection of claims 1, 9, and 12-14 as allegedly being anticipated by *Kuhr et al.*, applicants respectfully submit that a microcapillary hybridization chamber as recited in current claim 1, and claims 9 and 12-14 depending thereon, is not anticipated by *Kuhr et al.* Specifically, a microcapillary hybridization chamber comprising a narrow bore tubing with probe segments and an electrical potential applied separately to each segment, wherein the electrical potential allows for different levels of stringency of hybridization in each probe segment is not anticipated by *Kuhr et al.* For example, while *Kuhr et al.* at best appears to disclose an electrophoresis capillary tube, *Kuhr et al.* fails to teach or disclose application of an electrical potential separately to each segment as recited in instant claim 1. Accordingly, *Kuhr et al.* fails to teach or disclose every element of applicants' claims and, therefore, applicants respectfully request withdrawal of the rejection of claims 1, 9, and 12-14 under 35 U.S.C. §102(a) & (e).

In response to the 35 U.S.C. §102(e) rejection of claims 1, 9, and 12-14 as allegedly being anticipated by *Suyama*, applicants respectfully submit that a microcapillary hybridization chamber as recited in current claim 1, and claims 9 and 12-14 depending thereon, is not anticipated by *Suyama*. Specifically, a microcapillary hybridization chamber comprising a narrow bore tubing with probe segments and an electrical potential applied separately to each segment, wherein the electrical potential allows for different levels of stringency of hybridization in each probe segment is not anticipated by *Suyama*. For example, *Suyama* appears to at best disclose fluid movement only by mechanical means, including injection and suction mechanisms, but does not disclose electrophoresis as an approach for moving components through a hybridization tube. Accordingly, *Suyama* fails to teach or disclose every element of applicant's claims and, therefore, applicants respectfully

request withdrawal of the rejection of claims 1, 9, and 12-14 under 35 U.S.C. §102(e).

VI. Response to the Rejections under 35 U.S.C. § 103(a)

Claims 2-3 and 10-11 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over *Yasuda et al.* in view of *Suyama* and as allegedly being unpatentable over *Kuhr et al.* in view of *Suyama*. In addition, claims 25-28 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over *Yasuda et al.* in view of *Shalon et al.* Applicants respectfully traverse the rejections under § 103(a).

In response to the 35 U.S.C. §103(a) rejections, applicants respectfully submit that the combination of *Yasuda et al.* and *Suyama* does not motivate, teach or suggest each and every element of applicants' claimed invention. For example, and similar to that described herein above for the § 102 rejections, *Yasuda et al.* or *Suyama* alone or in combination, do not motivate, teach or suggest introduction of an electrical potential applied separately to each segment, wherein the electrical potential allows for different levels of stringency of hybridization in each probe segment to a microcapillary hybridization chamber of current independent claim 1. For example, *Yasuda et al.* appears to at best disclose a method and an apparatus for separating polynucleotides in the form of a capillary, wherein nucleotide probes are immobilized on the surface of the capillary and differing amounts of heat are applied to individual areas on the surface to enhance the separation. In *Yasuda et al.*, an electrical field is applied to individual areas of the surface, however, the field is used to attract nucleotide molecules only to the surface of the capillary rather than to increase the stringency of hybridization as disclosed and claimed in the instant application.

Suyama similarly fails to motivate, teach or suggest introduction of an electrical potential to a hybridization chamber of current claim 1. Instead, *Suyama* discloses fluid movement only by mechanical means, including injection and suction mechanisms, but does not disclose electrophoresis as an approach for moving components through a hybridization tube. Accordingly, *Yasuda et al.* and *Suyama*,

alone or in combination, fail to motivate, teach or suggest introduction of an electrical potential applied separately to each segment of a hybridization chamber, wherein the electrical potential allows for different levels of stringency of hybridization in each probe segment as recited in instant claim 1. Applicants therefore respectfully assert that the proposed combination fails to teach every element of current claim 1. Claims 2-3 depend from claim 1 and claims 10-11 are herein canceled. Accordingly, the proposed combination of *Yasuda et al.* and *Suyama* does not render applicant's pending claims 2-3 obvious, and applicants therefore respectfully request withdrawal of the rejection of pending claims 2-3 under 35 U.S.C. §103(a).

Similarly, applicants respectfully submit that the combination of *Kuhr et al.* and *Suyama* does not motivate, teach or suggest each and every element of applicant's claimed invention. For example, and similar to that described herein above for the § 102 rejections, neither *Kuhr et al.* or *Suyama*, alone or in combination, motivate, teach or suggest introduction of an electrical potential applied separately to each segment, wherein the electrical potential allows for different levels of stringency of hybridization in each probe segment to a microcapillary hybridization chamber of current independent claim 1. For example, *Kuhr et al.* appears to at best disclose an electrophoresis capillary tube. However, *Kuhr et al.* fails to teach or disclose application of an electrical potential separately to each segment as recited in instant claim 1. Addition of a system for mechanically moving fluid through a hybridization tube as taught by *Suyama* similarly fails to render obvious the applied electrical potential of applicant's instant claim 1. Accordingly, *Kuhr et al.* and *Suyama*, alone or in combination, fail to motivate, teach or suggest introduction of an electrical potential applied separately to each segment of a hybridization chamber, wherein the electrical potential allows for different levels of stringency of hybridization in each probe segment as recited in instant claim 1.

Therefore, Applicants respectfully assert that the proposed combination of *Kuhr et al.* and *Suyama* fails to teach every element of current claim 1. Claims 2-3 depend from claim 1 and claims 10-11 are herein canceled. Accordingly, the proposed combination does not render applicant's pending claims 2-3 obvious, and applicants therefore respectfully request withdrawal of the rejection of pending claims

2-3 under 35 U.S.C. §103(a).

In response to the rejection of claims 25-28 under 35 U.S.C. § 103(a) as allegedly being unpatentable over *Yasuda et al.* in view of *Shalon et al.*, applicants respectfully submit that the proposed combination does not motivate, teach or suggest each and every element of applicant's claimed invention. For example, and as described herein above, *Yasuda et al.* fails to motivate, teach or suggest every element of current independent claim 25. For example, *Yasuda et al.* fails to motivate, teach or suggest introduction of an electrical potential applied separately to each segment, wherein the electrical potential allows for different levels of stringency of hybridization in each probe segment to a microcapillary hybridization chamber of instant claim 25. The addition of *Shalon et al.*, which appears to relate to programmed detection of hybridization signals, fails to rectify the deficiencies of *Yasuda et al.* Therefore, applicants respectfully assert that the proposed combination of *Yasuda et al.* and *Shalon et al.* fails to teach every element of current claim 25. Claims 26-28 depend from independent claim 25. Accordingly, the proposed combination of *Yasuda et al.* with *Shalon et al.* does not render applicant's pending claims 25-28 obvious, and applicants therefore respectfully request withdrawal of the rejection of pending claims 25-28 under 35 U.S.C. §103(a).

CONCLUSION

In light of the above amendments and remarks, it is respectfully submitted that the present application is now in proper condition for allowance, and an early notice to such effect is earnestly solicited.

If any small matter should remain outstanding after the Patent Examiner has had an opportunity to review the above Remarks, the Patent Examiner is respectfully requested to telephone the undersigned patent attorney in order to resolve these matters and avoid the issuance of another Official Action.

DEPOSIT ACCOUNT

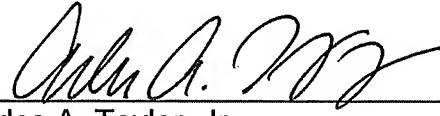
The Commissioner is hereby authorized to charge any deficiencies of payment or credit any overpayment associated with the filing of this correspondence to Deposit Account No. **50-0426**.

Respectfully submitted,

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